

## Claims

- (1) A method of fabricating a self-assembled monolayer of a substance on a substrate comprising depositing the substance on the substrate using compressed carbon dioxide as the solvent medium for the substance.
- (2) A method as claimed in claim 1, wherein the pressure and/or temperature of the compressed carbon dioxide is/are selectively controlled so as to enhance the density of the self-assembled monolayer on the substrate.
- (3) A method as claimed in claim 1 comprising the use of a co-solvent in combination with the compressed carbon dioxide.
- (4) A method as claimed in claim 3, wherein the co-solvent comprises at least one of H<sub>2</sub>O, CH<sub>3</sub>OH, CF<sub>3</sub>OH, CF<sub>3</sub>CH<sub>2</sub>OH, CF<sub>3</sub>CF<sub>2</sub>OH, (CF<sub>3</sub>)<sub>2</sub>CHOH, CH<sub>4</sub>, C<sub>2</sub>H<sub>4</sub>, C<sub>2</sub>F<sub>6</sub>, CHF<sub>3</sub> CCIF<sub>3</sub>, C<sub>2</sub>H<sub>6</sub>, SF<sub>6</sub>, Propylene, Propane, NH<sub>3</sub>, Pentane, iPrOH, MeOH, EtOH, iBuOH, Benzene, Pyridine.
- (5) A method as claimed in claim 1, wherein the substrate comprises a metallic substance.
- (6) A method as claimed in claim 5, wherein the metallic substance comprises at least one of gold, silver, copper, iron, mercury, palladium, gallium arsenide, ferrous oxide, indium tin oxide.
- (7) A method as claimed in claim 6, wherein the substance comprises a semi-fluorinated sulphur containing compound of the formula:

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 $[F_2C]_m$ 

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 $CF_2$ 

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 $[H_2C]_n$ 

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 $CH_2$ 

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X

Where X comprises  $R-SH$ ,  $RS-SR$  or  $R-S-R$ , where R denotes the rest of

the molecule;

Y comprises a functional group; and

m and n denote respectively the number of fluorinated and non-fluorinated carbon atoms.

(8) A method as claimed in claim 7, wherein X comprises a disulphide of sulphur.

(9) A method as claimed in claim 7, wherein X comprises a thiol.

(10) A method as claimed in claim 7, wherein Y comprises a  $CF_3$  functional group.

(11) A method as claimed in claim 7, wherein m and n lie within the range of 1 to 20.

(12) A method as claimed in claim 11, wherein m and n lie within the range of 5 to 10.

(13) A method as claimed in claim 12, where m is 8 and n is 10.

(14) A method as claimed in claim 7, wherein Y further comprises at least one of vinyl, styryl, acryloyl, methacryloyl or alkyne in combination with a spacer group.

(15) A method as claimed in claim 14, wherein the spacer group comprises at least one of  $\text{CH}_2$  or  $\text{CF}_2$ .

(16) A method as claimed in claim 1, wherein the substrate comprises at least one of glass, mica,  $\text{SiO}_2$ ,  $\text{Al}_2\text{O}_3$ ,  $\text{Ga}_2\text{O}_3$  or ITO.

(17) A method as claimed in claim 16, wherein the substance comprises a semi-fluorinated silane derivative of the formula:

Y

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$[\text{F}_2\text{C}]_m$

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$\text{CF}_2$

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$[\text{H}_2\text{C}]_n$

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$\text{CH}_2$

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Si

where Y comprises a functional group; and

m and n denote respectively the number of fluorinated and non-fluorinated carbon atoms.

- (18) A method as claimed in 17, wherein Si comprises a trialkoxy derivative.
- (19) A method as claimed in claim 18, wherein Si comprises at least one of  $\text{SiCl}_3$ ,  $\text{Si}(\text{OCH}_3)_3$ ,  $\text{Si}(\text{OCH}_2\text{CH}_3)_3$ ,  $\text{Si}(\text{OCH}_3)_2\text{Cl}$  or  $\text{Si}(\text{CH}_2\text{CH}_3)_2\text{Cl}$ .
- (20) A method as claimed in claim 17, wherein Y comprises a  $\text{CF}_3$  functional group.
- (21) A method as claimed in claim 17, wherein m and n lie within the range of 1 to 20.
- (22) A method as claimed in claim 21, wherein m and n lie within the range of 5 to 10.
- (23) A method as claimed in claim 22, wherein m is 6 and n is 1.
- (24) A method as claimed in claim 17, wherein Y further comprises at least one of vinyl, styryl, acryloyl, methacryloyl or alkyne in combination with a spacer group.
- (25) A method as claimed in claim 24, wherein the spacer group comprises at least one of  $\text{CH}_2$  or  $\text{CF}_2$ .
- (26) A method as claimed in claim 1, wherein the self-assembled monolayer has an ellipsometry thickness of about 30Å and a water contact angle of about 110°.
- (27) An inkjet head comprising a self-assembled monolayer as claimed in any one of claims 1 to 15 or claim 26, when appendant to any one of claims 1 to 15.

- (28) An electronic, optical or optoelectronic device comprising a self-assembled monolayer as claimed in any one of claims 1 to 5 or claims 16 to 26 or claim 26 when appendant to any one of claims 1 to 5, or 16 to 25.
- (29) A device as claimed in claim 28 comprising a thin film transistor or an organic semiconductor device, or a light emitting diode.
- (30) A device as claimed in claim 29, wherein the light emitting diode comprises an organic polymer light emitting diode.